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## The Bee in America.

[We have lately received from the author, Professor A. Gerstaker, of Berlin, Prussia, a copy of his treatise on the geographical distribution of the honey bee, from which we translate, for the BEE JOURNAL, the portion which relates to the introduction of that insect in this country. It is probably the most complete view of the subject yet presented, though not one entirely satisfactory to an inquirer. We have also a paper on the subject prepared by an American gentleman, which we propose publishing hereafter, and may avail ourselves of the occasion to append some suggestions of our own.]

It is well known that the territorial range of our honey bee is not confined to the continents of the old world, but extends at the present time over a great part of the American continent also. Until within a very recent period, however, the variety there prevalent was exclusively the unicolor brown or black bee of northern Europe. That this bee has been introduced from abroad in certain American countries cannot well be questioned, as the facts and dates are matters of record. Thus, according to Reinhardt, it was first carried to Brazil in 1845. But as regards North America, where it is known to have existed for a much longer time, doubts have been entertained whether this insect was imported from abroad or whether that country also is to be considered as an original centre of distribution. The former opinion is that which has been adopted by almost all the more distinguished entomologists of Europe, with the exception of Olivier, (*Encyclopædia méthodique, Insects I, p. 49,*) who thinks it doubtful whether the European and

the American bee are strictly identical. Latreille, Lapeletier, Lacordaire, and Westwood treat of them as being the same. Significant as are the conclusions of such authorities, it must still be more interesting and satisfactory to ascertain the opinions of those whose residence in that country gave them superior advantage for forming an enlightened judgment. Among these we have first to cite Thomas Jefferson, who, in his *Notes on Virginia*, says,—“The honey-bee is not a native of our country. Maregrave, indeed, mentions a species of honey, bee in Brazil. But this has no sting, and is therefore different from the one we have, which resembles perfectly that of Europe. The Indians concur with us in the tradition that it was brought from Europe; but when, and by whom we know not. The bees have generally extended themselves into the country, a little in advance of the white settlers. The Indians, therefore, call them the white man's fly, and consider their approach as indicating the approach of the settlements of the whites.”

On this opinion of Jefferson, entitled to the more weight as emanating from an American, Prince Maximilian de Wied seems to rely, when he says, (*Travels in North America*, vol. 1, page 180), “It is remarkable that the bee, which Europeans brought to America, is now diffused everywhere in the forests. The Indians are said to call this insect ‘the white man's fly.’” But a subsequent passage, (*Travels* vol. 2, page 346,) is evidently based on his own observations. “It is known that the bee is not a native of America, but has been diffused there since the arrival of the Europeans in North America. It now extends far up the Missouri river, and honey is cut out of hollow trees both by the Indians and the whites.” As among those sustaining this position we must further

advert to John Josselyn, who resided in New England in 1638, and again in 1663. In his account of his travels, (*Voyage to New England*,) page 120, he says: "The honey-bees are carried over by the English, and thrive there exceedingly." But a still higher authority is Dr. Benjamin Smith Barton, who, in a treatise evincing both impartiality and an intimate acquaintance with the subject, entitled "*An inquiry into the question whether the Apis Mellifica or true Honey Bee is a native of America*," and which was published in the "Transactions of the American Philosophical Society" for 1793, declares very positively that this bee was introduced from Europe, and presents ample evidence of the fact. The importance of this treatise, on this point, induces me to quote from it further on, a series of passages, the more valuable doubtless from the circumstance that the very existence of the treatise seems scarcely to be known in Europe. To the evidence adduced by Dr. Barton, I shall append some in addition, which the more advanced state of our knowledge of the subject enables me to supply.

Meantime I cannot omit saying that, at least among the Americans, there have not been wanting writers unwilling to concede that their native land cannot claim the honor of possessing originally so useful an insect as the honey bee; and who have undertaken to controvert the arguments of those who regard it as of foreign origin. How unsatisfactorily one of these writers, J. C. Van Heuvel, has attempted to do this in Silliman's American Journal of Science, for 1821, vol. 3, has already been fully shown by Mr. Brunin the Bienenzeitung for 1858, page 37. But I do not quote his arguments, as I have ascertained that they are not the suggestions of his own mind, being in the main taken from a production of Dr. Belknap, quoted by Dr. Barton. In the year 1792, Dr. Belknap, published at Boston, a "*Discourse intended to commemorate the discovery of America by Christopher Columbus*," to which was appended the evidence against the theory of the European origin of the honey bee. According to Dr. Barton's statement, Dr. Belknap bases his views on the following facts:—1. Columbus, by his own account and that of his son, when on his first return from the Antilles, fearing, on the approach of a storm, that if his vessel foundered at sea, the knowledge of his discoveries would be lost to the world, enclosed a detailed narrative of his voyage, engrossed on parchment, in a cake of wax which had been procured at Hispaniola, and committed it to the waves. 2. According to Purchas, the Mexicans, long before

the arrival of the Spaniards, were required to deliver to their kings, as an annual tribute, a certain quantity of honey in addition to other products of the country. 3. According to Purchas, also, Ferdinand de Soto, when arriving with his forces at Chiaba, in 1540, found there a pot of honey in possession of the natives. As there were at that period, with the exception of Mexico and Peru, no Europeans settled in America, the finding of this pot of honey is regarded as conclusive evidence that the honey bee must have existed in America before the arrival of the Europeans.

As regards items 1 and 2, as Dr. Barton remarks, they do not in the remotest degree tend to prove that the *Apis mellifica* then existed in the Antilles and Mexico. The wax used by Columbus may have been of vegetable origin, yielded by the *Myrica cerifera*, for instance; but this conjecture need not be resorted to, since it is well known that, both in the Antilles and Mexico, wax may have been obtained in great abundance from the there existing numerous varieties of *Trigona* or *Melipona*. If five varieties of these native (stingless) bees in Mexico were already known to the Abbe Clavigero, as Dr. Barton states in refutation of Belknap, whereas sixteen varieties of them are now known to naturalists, the Mexicans may surely be supposed to have no cause to complain of the want of wax before the arrival of Cortez. It follows of course that the first two proofs adduced by Belknap are of no force whatever. An at least apparently much more valid proof might have been derived from the writings of Hernandez in which the existence of honey in Mexico prior to the sixteenth century is indicated! In his treatise "*Rerum medicarum novo Hispania Thesaurus*," Rome 1648, lib. IX page 333, he says—"Multa mellis genera in nova Hispania mihi adhuc observare licuit, non loco soleum, valute vetere orbe, verum ipsa materia et apum diversis generibus distantia. Primum est Hispaniensi per omnia simile idemque et quod ab apibus Hispanices congeneribus sponte in cavitatibus arborum fabricatur, quas Indis secta in apiaria reponant de congerunt."

To a writer like Belknap, who obviously labored to make out a case, so distinct an averment as that of a physician, who wrote certainly not later than seventy years after the conquest of Mexico, would have been of the utmost significance. Unluckily, however, he had as little knowledge of him as Dr. Barton had. Abstractly regarded, the passage quoted might seem decisive of the point here in issue; but when minutely scrutinized it loses much of its

weight. It might, in the first place, be alleged that before the year 1520, when Cortez conquered Mexico, and the close of the sixteenth century, time enough had elapsed to permit the introduction of the honey bee from Spain, and judging from its rapid spread in North America, a similar wide diffusion may have taken place in Mexico, prior to the time of Hernandez.

But it does not seem to me at all necessary to resort to such an hypothesis. I am inclined to believe that Hernandez, who was by no means distinguished as a zoologist, erred regarding the identity of the bee mentioned by him as the *Apis mellifica*; and that a *Melipona*, a known native of Mexico, was mistaken by him for our honey bee. There exists in that country a species of *Melipona*, occupying a position intermediate between *Melipona rufiventris* and *Melipona bicolor*—being distinguished from the former by its black legs and dark hirsute brow, and from the latter by its rust-colored abdomen. It approximates the European honey bee so much in size and form, that an inexperienced observer of the sixteenth century might easily have mistaken the one for the other.

As to the third of Belknap's proofs, Dr. Barton conceives that the honey first found by De Soto is as little decisive as the tribute of the Mexicans, because of the existence there of Meliponas and Trigonas, honey producing native bees. But this position of Dr. Barton is not tenable. Whilst numerous kinds of such native bees are known to us as occurring in Mexico and the Antilles, we have as yet no evidence that any of these species exist in Florida. It is however by no means improbable that such may be found there. Though until now only a single species of *Melipona* (*Apis atrata*, Fab.) is known to exist in any part of North America, yet as the northern borders of Mexico and the Antilles are the northern limit of the Meliponas and Trigonas, it is not unlikely, according to the law of geographical distribution, that the sole species yet found has spread beyond its strict natural boundary, and that some others may exist in the southernmost parts of North America, and consequently in Florida. But be this as it may, the narrative of Purchas cited by Belknap, by no means authorizes the assumption that the European bee existed in Florida at the time of De Soto's excursion. Besides, another account, quoted by Dr. Barton, and emanating from a Portuguese nobleman, who accompanied De Soto, decidedly refutes it. This narrative, being "A relation of the invasion and conquest

of Florida by the Spaniards under the command of Ferdinand de Soto," states that "the Indians of Chiaha had large quantities of butter or rather grease in pots, fluid as oil; they called it bear's grease. We found there also walnut oil, clear as the grease, and a *pot of honey*, though we saw no bees nor honey in Florida before or afterwards." This simple statement, as Dr. Barton remarks, is important: De Soto and his successor, Alvarado, had explored the country in all directions, from 1539 to 1543. The troops had ransacked all the stores of the unhappy natives, and yet, with the exception of a single pot of honey, neither honey nor bees were encountered in the forests. Had our honey bee been native there, it would unquestionably have been frequently seen on some of the rich flowering plants abounding there.

Finally, too, the position of Belknap is refuted by a communication addressed to Dr. Barton, which expressly specifies the time when the bee was introduced into Florida. It was made by his trustworthy friend William Bartram, and is as follows:—when Bartram was in West Florida, in 1775, a colony of bees was shown to him as a curiosity, being the only one in the neighborhood. It was introduced there when the English took possession of Pensacola. In East Florida the honey bee is now, indeed, found in a wild state, and has been known there for a long period—perhaps a century. But his researches had satisfied him that it is not a native of that country.

If the arguments which have been employed to show that the honey bee is a native of America, are thus sufficiently refuted, others more conclusive, on the other hand, can be adduced to prove its introduction from Europe. If this could not be shown by precise historical dates, two circumstances adduced with emphasis by Dr. Barton, would satisfactorily demonstrate it. The first is the well known fact that when John Eliot translated the Scriptures in the language of the aborigines of North America, no words were found expressive of the terms wax and honey. The second is, that the natives themselves, in the different regions of the country, regarded the honey bee as a foreign insect. This is shown by the name, "*the white man's fly*," which they applied to it. The Rev. John Heckewelder reported to Dr. Barton, that though he had found the honey bee, in a wild state, in various parts of the United States, and at points remote from white settlements, he was everywhere informed by the Indians that this insect was not known to them previous to the arrival of the white man. Belknap indeed endeavors to

show that the observation that the bee always moves somewhat in advance of the white settlements, by no means proves that it was introduced from Europe; but that it came to be called the "white man's fly" simply from this circumstance. Dr. Barton replies to this, in his usual clear and conclusive manner, "if that circumstance be not decisive, it is nevertheless of great significance." He had himself always regarded the name by which the Indians designated this insect, as positive evidence of the correctness of Mr. Jefferson's conclusions that it is not of American origin. Conceding the alleged ignorance and simplicity of the Indians, they were still by no means incompetent observers of plants and animals, having watched the progress of those introduced by the whites with the greatest attention. Thus they called the broad leaved plantain "the Englishman's foot," and said wherever a European wandered this plant sprung up in his footsteps—meaning thereby to express the idea that it was not known to them before the arrival of the Europeans. In the same sense altogether was the expression, "the white man's fly," used by them to designate the honey bee as an exotic. And when the southern Indians saw this insect in the forest, they inferred that the white man would soon make his appearance also. Probable as these two circumstances render it that the North American honey bee is of European origin, they yet do not determine the question with absolute certainty. To this end we must necessarily demand the production of ascertained historical dates, showing how and when the bee was first transported from Europe to America. Unfortunately I have hitherto been unable to trace the time when, and the European country from which, the transportation was effected. But that such transportation did take place, cannot in the least be doubted, when, in addition to what has already been adduced, we consider the following historical accounts, which, as emanating from eye witnesses cannot well be called in question. 1. According to Dr. Barton, Penn, the founder of Pennsylvania, does not mention the bee in his detailed report to friends, written in 1683, though he would doubtless not have omitted so useful an insect in his list of native animals found in Pennsylvania, if he had known of its existence there. The older Swedish writers, also, treating of their settlements in Pennsylvania, do not mention the bee. 2. Lawson, in his '*Voyage to Carolina*,' London, 1704, does not enumerate the honey bee among the native animals of Carolina. 3. Dr. Barton (page 288) states, "the honey bee was not found in Kentucky when we first became acquainted with

that country. But about the year 1780, Col. Herrod brought a hive to the falls of the Ohio, since which time these insects have multiplied exceedingly. Not long ago a hunter found thirty wild swarms in one day." 4. The same writer says further: "The honey bee was not known in the Genesee district of New York, when first visited, nor for some time thereafter. Lately (about the year 1790) a few colonies were introduced, and these will undoubtedly spread through the country." 5. D. B. Warden, in his "Statistical, political, and historical account of the United States of America," quotes from Bradbury (whose work I have not yet seen) the following passage: "Before the year 1797, the honey bee was not found to the west of the Mississippi. They are now seen as high up as the Maha nation on the Missouri; having proceeded westward six hundred miles in fourteen years. 6. Humboldt, in his Political Essay on the Kingdom of New Spain, says, "Cette cire de l'île de Cuba ne provient cependant qu'en petite partie des Trigones sauvages, qui habitent les troncs du Cedrela odorata, le majeure partie en est due à l'abeille originaire du nord de l'Europe (*Apis mellifica*), dont le culture s'est fort étendue depuis l'année 1772." 7. The same author, in his "Political Essay on the Island of Cuba," says, "Cette cire n'est pas le produit d'abeilles indigènes (*Meliponas*), mais d'abeilles introduites d'Europe par la Florida. Ce commerce n'est devenu très important que depuis 1772." 8. According to Ramon de la Sagra, in his work on Cuba, the introduction of the honey bee from Florida took place in the year 1764. And in a later work of the same author, the honey bee, *Apis mellifica* is mentioned as "imported into Cuba." 9. According to Olivier, (*Encyclopédie methodique, Insects* 1, p. 49.) Don Ulloa reports that "on the island of Cuba colonies of the European bee have become exceedingly multiplied in the vicinity of Havana, during the brief interval since 1764. Before that date there were no bees on the island, except such as belonged to the wild and other species. The families which till then had resided at St. Augustine in Florida, brought some hives with them when they migrated to Cuba, which they set out at Guanavacoa and other places. These insects multiplied so greatly that swarms soon reached the hilly country, and they were so prolific that a colony yielded from one to two swarms monthly, though requiring less attention and care than in Europe." 10. Moreau de Saint Mery, in his "Description of the Island of St. Domingo," says, "En 1781, M. le comte de La Croix, capitaine de vaisseaux, a transporté sur le vaisseau l'Anni-



*bel est il commandait, six ruches d'abeilles de la Martinique, qu'il envoya sur son habitation des Gonaïves. La plupart périrent, parceque cet officier fut obligé de les abandonner à cause de son service, le rest se réfugia dans les montagnes voisines. Mais quelques habitans et notamment M. Pascal aine de la Grande Rivière des Gonaïves en ont recueilli de jeunes essaims qui prospèrent."*

Comparing all these accounts, we reach this result: that until within a recent period, the honey bee was not known in the various sections of North America in which it now abounds; and that in some of them, as for instance in Genessee, in the State of New York, and west of the Mississippi, it was introduced only within the last sixty or seventy years. At the same time we learn that its diffusion, beginning in the southeast has been progressing towards the west and the north, though not with uniform rapidity. We find it first in West Florida, in 1763; then in Kentucky in 1780, shortly after 1793 in New York; and west of the Mississippi in 1797. (According to Josselyn, it existed in the English settlements of North America as early as in the seventeenth century, having been introduced there from England.) Its first appearance at a comparatively recent period, and its gradual diffusion from one or more central points, would dispel all doubts as to its introduction from abroad, and could not be explained otherwise than by assuming the doctrine of spontaneous generation, which even Belknap would not have had the temerity to do. We now possess, moreover, certain evidence, from Bartram, that it was imported into Pensacola in 1763, by the English; and there could have been no motive for this, if the bee already existed in North America, as a native. From Florida, according to Don Ulloa, and Ramon de la Sagra, and in direct contradiction of Belknap, it was carried to Cuba—though not, as the former states, from Pensacola, but from St. Augustine on the eastern coast of the peninsula. If it already existed here, as Bartram states, at the close of the seventeenth century, it is probable that it was introduced by the Spaniards who founded that city in 1565, and Florida did not come in the possession of the English till 1763. To Mexico it obviously did not come from Florida and the United States, but was undoubtedly introduced at an earlier period by the Spaniards, for Clavigero states that it already existed there in his time—though his statement seems to be contradicted by Humboldt, who says that the wax of Yucatan is the product of a native bee. The introduction, clearly ascertained on the part of the English, and rendered highly probable on

the part of the Spaniards, agrees with the fact that the common black bee prevalent in America is precisely the same variety which prevails exclusively in their countries. And the supposition of an Asiatic source is excluded by the fact that the prevalent variety of bees in Asia, from which the communication must have been effected, is a very differently marked and light-colored insect.

Having thus, as we conceive, established the fact that the honey bee was introduced from Europe, into North and Central America, we shall glance cursorily at its present distribution there, and its remarkably thriving condition in that quarter of the world—especially in the island of Cuba, where the production of wax has been prosecuted extensively only since the year 1792.\* How greatly it has increased in seventy years is manifest from the following statistics: According to Humboldt the quantity of wax exported from 1774 to 1779, was only 2,700 arrobas, or 81,000 pounds. But in the year 1803, the export reached 42,700 arrobas, or 1,281,000 pounds. Ramon de la Sagra states that the annual export during the first thirty years of the present century was 69,476 arrobas, or 2,084,280 pounds of wax, and 84,044 arrobas, or 2,521,320 pounds of honey. Doubtless the quantity produced has been greatly increased in the last twenty years.

As regards the distribution of the honey bee in other parts of America, south of Mexico and the Antilles, an examination of the published works of recent travelers has not much enlarged our knowledge. That it is already domiciliated in Honduras, is stated by E. G. Squier in his Notes on Central America, which is not surprising in view of the fact that it has long existed in Mexico. But it does not appear to have spread further south from this country, since there is no allusion to its existence in the adjoining Republic of Costa Rica. It is not alluded to by Wagner and Sherzer in their published account of that Republic, and it is scarcely credible that so thorough an entomologist as Moritz Wagner would have passed it without remark, if he had observed it. In like manner, as I am informed orally by Prof. Karsten, it has not yet been found in the regions bordering on the coast of South America, in New Grenada and Venezuela; and it is not contained in the collection

\*This circumstance may also show that the honey bee, is not, as Belknap contended, a native of the Antilles, but was imported from abroad. The large exportation of wax began in Cuba only several years after the introduction of the *Apis Mellifica* in 1764. Several species of native Meliponae and Trigonae existed there before, without leading to any attempt to make their products of commercial value, and importance.

of insects made there by Moritz Wagner, who long resided in that country. According to Reinhardt bees were first carried from Portugal to Brazil (Minas Geraes) in 1845; and that they have been extraordinarily multiplied there since, is stated by Brun in the *Bienenzeitung* for 1858, page 43. This latter circumstance is likewise thus mentioned by Burmeister, in his *Travels in Brazil*: "As in most districts of Brazil the domestic honey bee is cultivated, and there is moreover no lack of sugar, the honey of the wild bees is gathered only to gratify particular tastes. I have never heard that the honey of the *Melipona Amalthea* is used." The occurrence of the honey bee in southern Brazil seems to be the extent of its distribution in South America—at least we can with great probability assume that it is not found in La Plata and Chilli. We possess, through Claudio Gay, a rich entomological fauna of the latter country, in which there is no allusion to the *Apis Mellifica*; and La Plata has been recently thoroughly explored by Burmeister, one of the most distinguished entomologists of our day, and I have myself examined his collection of insects, without finding the honey bee therein.

Without endeavoring to combat the vulgar prejudice in favor of giving a south or south-eastern aspect to the bee house, it is sufficient to remark, that actual experience warrants me in saying that the point of the compass towards which the entrance to the hive is turned, is not of the least possible importance. In a city, where dwellings are huddled together, and where spacious front and back yards cannot be afforded, it would be impossible always to give the same aspect to the hive. Fortunately, therefore, success does not depend on this circumstance. It has been well ascertained that wherever breathing animals can exist the bee may flourish, whether the opening on the hive faces the north or the south, the east or the west. If a yard is small, but at the same time dry, that is enough. But if there are high walls, with constant dampness at the bottom, the place may be regarded as unfavorable.

The vulgar notion that it is necessary to ring bells, rattle tin pans, or blow horns, when bees are swarming, is based upon the supposition that the bee has an ear organized like man's, and that through this highly developed sense, its mind—its reasoning power—is to be operated on through the influence of fear! If bees could recognize the hoarse vibrations of many domestic utensils brought into requisition at some country farm-houses, in swarming time, there is no doubt they would be frightened! Nothing can be more absurd than this procedure, which does no more toward housing the bee, than it does towards staying the tides.

### Range of Bees' Flight.

Several mistaken writers agree in remarking that, in foraging, bees rarely go more than a mile, or a mile and a half from home. This my own experience proves to be otherwise. On an island in Boston harbor I had a hive of bees in a flourishing condition, whose range could not have been less than between three and four miles, in order to procure their full store. The island on which they are located has but few flowers at any time, and on the whole presents, to an apiarian, a forbidding aspect. Notwithstanding these discouraging circumstances, the quantity of honey, from season to season, was unexpectedly large, and must therefore have been procured from neighboring islands, or the mainland. The nearest island is one mile distant, and on another, about a mile and a half away, honey bees have been observed in great plenty, when the white clover was in blossom; and a farmer there informed me that he had repeatedly seen them arrive from and depart for the island on which their hive stood.—J. V. C. Smith.

### Anatomy of the Honey Bee.

Like larger animals, bees are anatomically considered under the three following divisions, viz: *head, trunk, and extremities.*

The external structure of the head cannot be investigated, but that it is exceedingly complicated, there can be no doubt. In the *trunk*, the second portion of the body, being the mass between the head and the abdomen, are lodged the minute organs of motion belonging to the legs, wings, and parts of the secretory and vital apparatus. Within the *abdomen*, constituted of six hoops, sliding within each other, like the tubes of an object-glass, are contained the procreative organs, the respiratory tubes, the intestines, and the beautiful but complicated machinery of the sting.

The *wings* of bees are beautifully arranged, being a delicate tissue stretched over a framework of tubes, through which the air circulates freely, by reason of their communication with the spiracles, or breathing holes, on the sides of the insect. Under the microscope the wing is an interesting object.

No long grass or tangled weeds of any kind, no cabbage or lettuce plants should be suffered to grow within two yards of an apiary, more particularly in front.

The vicinity of lime or brick kilns, tan-yards, gas-houses, and offensive premises of every kind, is annoying to bees.

Difficult as the *science* of bee-keeping unquestionably is, it is not beyond the reach of attentive perseverance.

The more simple the hive, the more perfect, and therefore the more deserving.

### The Fossil Bee.

Like the greater number of domestic animals and cultivated plants, the honey bee presents itself to our notice in the earliest periods of history, as the companion of man. The oldest human records mention it as occurring on the coasts and islands of the Mediterranean and the Black Sea, and the countries adjacent. They speak of it as being very generally distributed in the interior of the continents of Asia, Europe and Africa, so far as the commerce, travel, and military movements of the ancients extended, as in Egypt, Persia, Syria, Thrace, Scythia, &c., &c. In all these regions, moreover, the honey bee appears as a native insect. Nowhere do we find among the ancients any account of its transplantation, by man, from one country to another.

Further back, in the dim foreshadowings of the pre-historic period, we are reminded of the bee, by frequent references and allusions to honey and wax, the products of her industry, the former of which, aromatic, luscious, and grateful to the human palate, has, in common with milk, been ever regarded as the evidence of fertility of soil and national prosperity.

Bees played a prominent part alike in the mythology and religious worship of the Egyptians, Greeks and Romans, and it is certainly not without significance, as regards the intimate relation of these three early civilized people, that the prevalent popular belief regarded the bee as originating from the putrifying carcasses of kine; and that the name of the sacred bull of the Egyptians was perpetuated in the Latin designation of this insect—*Apis*.

The first faint traces of bee culture, too, reach back everywhere to the era of legends and sagas. In Spain, the *Kunetæ*, dwelling in the neighborhood of Tartessus, ascribed the discovery of the art of procuring honey to their ancient King Gorgoris; while the Greeks and Romans assigned this art, as well as that of housing swarms in specially constructed hives to their Gods, or to the supposed descendants of those Gods. Thus in Greece, Dyonisos, or Bacchus, the son of Leus and Semele, and Aristæus, the son of Apollo and Cyrene, were honored as inventors; and the "sacred soil" of Thessaly was regarded as the scene where these useful inventions and discoveries originated.

But still further back, beyond even the misty pre-historic period—of which no written records survive to designate names and note occurrences, and to which we are referred merely by fragments of warlike weapons and domestic utensils, by ruins of structures and mouldering building material, by remnants of clothing, by charred articles of subsistence, and by undecayed portions of animal and human bones, we find at least some indications which justify us in asserting the contemporaneous existence of the honey bee. Belonging to the stone period of the ancient Helvetian pile drivers, there are found, more or less well preserved, certain vessels of clay, which, in the opinion of Mr. Escher, of Berg, when filled with fresh gathered honey in the comb, and placed over other perforated ves-

sels, as is still customary in some parts of Switzerland, might serve to drain off the liquid sweet. Others, indeed, consider them as implements used in the manufacture of cheese; but this seems to be the less probable conjecture. The organic remains found in the same localities, indicate very clearly the presence there and then of plants, insects, and animals, which even at the present day have a close and distinct relationship to the life and economy of the honey bee.

And yet further back, in periods antedating the latest developing convulsions of the earth, prior to the elevation of the Alps and the Apennines, we are presented with organic remains evidencing the prevalence in Switzerland of a sub-tropical climate and a medium temperature of 62°, even in the upper miocene of the geologists, the honey bee has been found in a fossil state. It was found, too, in this state, among numerous fossilized remains of flowering plants loved and frequented by the bee; and among other honey loving and honey gathering insects, similarly preserved. This, the only yet known specimen of the honey bee—the true *Apis mellifica*—found in a fossil state, was discovered in the insect bearing strata of the slate quarries of Oeningen, and first recognized as an *apis* by Professor Heer, from the peculiar structure of its wings and other distinguishing marks. He named it *Apis Adamitica*—the Adamitic Bee. It differs from the *Apis dorsata* of Fabricius, by the special veining of its wings and by its smaller size. It is larger than the *Apis Indica* and the *Apis florea* of Fabricius, the former of which is not half so large as our common bee, and the latter is still more diminutive. It corresponds, however, very closely with the fifth variety of the species, the universally known *Apis mellifica* of Linnaeus, so exclusively cultivated by man, as the honey bee *par excellence*; and may hence be rightfully regarded as the true original of the race.

Thus we find the honey bee existing as a denizen of the earth thousands of years before the creation of man and undoubtedly then, as now, dwelling in communities, instinctively laboring for a common object, with all its merit of industry, its love of order, its cleanliness, its faithful devotion to its duties, its strong attachment to the queen, the brood, and the co-workers of the domestic household. Then, as now, also, with joyful humming, joining the innumerable choir of music-producing creatures, feeling and expressing joy and sorrow, vigilant and courageous in its conflicts with assailants, and compelling all to treat it with respect by the pain and poison of its sting. Then, as now, too, storing up its gathered treasures in artistically celled combs constituted of self-elaborated wax. Nothing permits us to suppose that her instincts, habits, inclinations and impulses have undergone any change in the long lapse of ages, as all these are known to have remained identically the same during the twenty-two centuries which have elapsed since the days of Aristotle. And they are the same everywhere as with us, whether under the mild sky of the tropics, or in the rougher regions of the north.



There is probably some exaggeration in the following account of Wildman's exhibitions, though from the high reputation he enjoyed in England, he must have been an expert operator:

**HANDLING BEES.**—It is a peculiarity of bees that they will suffer some men to handle them with impunity. Wildman was a man who seems to have had an unusual attraction for them, or command over them, as he termed it, though it is not easy to comprehend how a man could have command over four thousand or five thousand insects. On one occasion he paid a visit to Dr. Templeton, the then Secretary of the Society for the Encouragement of Arts, to prove to him how completely bees submitted to his influence. He was brought through the city in a sedan chair, and, it is to be presumed, into the doctor's room, for when he presented himself his head and face were covered with bees, and a huge cluster of them hung down like a beard from his chin. Notwithstanding this novel appendage, he conversed with the ladies and gentlemen who were present for a considerable time without disturbing the insects, and finally dismissed them to their hive without anybody being stung. The fame of his performances having reached Lord Spencer, he invited him to Wimbledon to meet a large party of his friends. The countess had provided three stocks for the occasion. He first took one of the hives and emptied the living occupants into his hat to show that it was not necessary to destroy the bees in order to deprive them of their honey. He next presented himself with a colony hanging about his head and from his chin, and then stepping out of a window on to a lawn, where he had directed a table covered with a clean cloth to be placed, he put them back into the hive. He then made them come out again and swarm about in the air, after which he caused them to settle on the table, and from thence he took them up by the handful, and poured them out of his hand as if they had no more feeling than pebbles, and finally concluded this portion of his entertainment by causing them to re-enter their hive. His lordship was too unwell to be present at these experiments, so, later in the afternoon, he was taken into his lordship's room with all three of the stocks hanging about him at one time, one on his head, one on his breast, and the other on his arm, from which places he afterwards transferred them to his head and face, so that he was quite blinded, and was led in this condition to the lawn in front of his lordship's window. He next requested that a horse might be brought round, which was done, the horse having been first well clothed to guard against accidents. First taking the bees out of his eyes that he might see what he was about, he mounted the horse with the bees hanging about him, and rode backwards and forwards repeatedly, until the company had seen enough of his performance, when he dismounted and placed the bees on the table, from whence he dismissed them to their respective hives. It is worthy of remark that though there were a great many persons present on this, as on the previous occasion, yet nobody was stung.

The means by which Wildman exercised this unusual influence over the bees was by securing the queen, which long experience enabled him to identify without difficulty among the host of others, and placing her on any part of his body on which he wished the swarm to settle.—*At the Year Round.*

### Statistics of Bees.

According to the census of December 3, 1804, the number of hives of bees in the kingdom of Prussia—containing 107,822 square miles, and a population of nearly 18,500,000—was 761,284, distributed as follows, viz:

PROVINCE.	SQUARE MILES.	HIVES.
1 Prussia, .....	24,926	135,592
2 Posen, .....	11,342	70,265
3 Brandenburg, .....	15,468	100,764
4 Pomerania, .....	12,146	76,470
5 Silesia, .....	15,700	112,532
6 Saxony, .....	9,754	79,627
7 Westphalia, .....	7,787	65,091
8 Rhine, .....	10,305	115,492
9 Hohenzollern, .....	440	5,492
10 Chase forest, .....	14	22

The value of these hives at an average of only \$2.66 each, exceeded two millions of dollars. The average number of hives to the square mile was only seven, though the country could easily sustain fourfold that number. The average number of hives to each individual of the population, was twenty-five.

In the Dutchy of Nassau, containing two hundred and sixty-eight square miles, and a population of 468,311, there were at the same period 14,124 colonies of bees—being fifty-two to the square mile, or one to every thirty-three inhabitants.

In the Grand Dutchy of Hesse, containing four hundred and seventy square miles, and a population of 855,000, there were at that time 42,000 colonies—being eighty-nine to the square mile, or one to every twenty-three inhabitants.

It was the opinion of Huish, a distinguished English writer on bees, that within the circumference of ten miles of London, ample provision might be found for the support of ten thousand hives of bees.

The same remark is applicable to Boston, New York, Philadelphia, Baltimore, Washington, and a hundred other cities and towns in the United States. Yet there are probably not five hundred hives kept in the immediate vicinity of any one of them. An opinion is prevalent that nothing exists in a paved town from which this industrious insect could select even enough for the support of its domicile. This is an error, which it is one object of this publication to correct.—*J. V. C. Smith.*

Hives placed on the high, flat roof of a shed, suitably shaded by a temporary roof of boards, to protect them from the scorching rays of the sun, are always thrifty and healthful. This is owing, probably, to the purity of the atmosphere, at a distance from the ground.



**Bee Culture in Cottage Hives.**

No. 1.

☞ This series of articles, derived mainly from the writings of an experienced and highly intelligent German apiarian, is designed for the benefit of such bee keepers as still use the ordinary hives. Many of these have no convenient opportunity to procure movable comb hives, or perhaps prefer adhering to the old mode, till the new system of management has been more fully tested. They are a numerous and worthy class, who having persevered in practical bee culture amid incessant disappointments and kept their faith through long years of discouragement, have strong claims to consideration, and will here find much to interest and instruct them.

In its normal condition a colony of bees contains a queen, a large number of drones, and also from shortly after the beginning of active labor in the spring to the close of the swarming season, a limited number of drones. The queen is a female; and is moreover the only perfectly developed female in the community. She lays all the eggs which the hive contains, whether they produce queens, workers or drones. When she is removed or destroyed, the colony is queenless, and is as certain to perish as it is when, from superannuation or disease, the queen becomes unable to lay eggs or lays drone eggs only. In the swarming season, however, and more especially after the old queen has gone off with the first swarm, there is for a short time no fertile queen present in the hive. But usually there are then a number of young queens nearly mature or maturing, contained in royal cells, of which the eldest one will emerge in the course of a few days. Or if the swarm departed before the usual preparatory arrangements were made, eggs or larvæ are immediately selected from which to rear queens. Hence the condition of such a colony is not to be regarded as strictly one of queenlessness.

Queenlessness, at any time except during the swarming season, demands prompt attention, as the colony in which it takes place is doomed to perish, unless a timely remedy is provided. All the honey it contains will be consumed by its own bees, or carried off by intruders from other colonies, if its unfortunate condition is not early discovered. Accordingly, a colony which, except in the swarming season, has either no queen or one entirely sterile, or one laying drone eggs exclusively, is not in a normal condition; and is sure to become the prey of worms, if the misfortune be not observed and remedied at an early day. Cases of the latter kind—the presence namely of an exclusively drone egg laying queen, are very rare, though I have known one case in its most aggravated form. This contained drone brood, ranged cell after cell, in comb after comb, as regularly and compactly as though it were worker brood laid by a healthy normal queen. All the cells were sealed with concave caps. Masses of small

brownish hirsute drones filled the hive, being tenfold more numerous than the few surviving workers interspersed among them.

More frequently, especially in hives from which several swarms have successively issued, cases of queenlessness occur when the hive contains neither eggs nor brood from which a queen could be reared. In such cases, scattered clusters of drone brood are placed very irregularly in drone cells. These are the product of eggs laid by some individual fertile worker, which can produce drones only.

Equally abnormal is the condition of a colony which retains and cherishes its drones long after the usual period of the general drone slaughter. It is always safe to presume such a colony queenless, and act accordingly. Dr. Donhoff alleges, on the strength of some experiments, that there is reason to suppose that it is from the instinctive desire of the workers to possess a queen, and their knowledge that the drones are indispensable to her fecundation, that they are impelled thus to retain them.

According to the testimony of trustworthy observers, a second though aged queen is occasionally found in otherwise normal colonies, in autumn and winter. The instances, however, are extremely rare; and the aged queen, whose presence seems to be barely tolerated, speedily disappears, without in any degree affecting the prosperous condition of the colony.

Almost all writers on bees speak in admiration of the devoted attachment which the workers are alleged to bear to their queen. This has of late been called in question. Recent observers have detected many instances where the workers not only destroyed queens to which they had long been accustomed, but young queens also, just returning from successful hymenial excursions. The cause of this is still involved in mystery, though it has been remarked the greater number of instances occurred immediately after the hives had been opened and the bees disturbed. Nor does it seem to be safe or advisable to seize a valuable queen with the bare fingers, and then return her to the hive, as she may thus acquire an odor offensive to the workers.

The queen proceeds from an egg laid by a fertile<sup>a</sup> queen and bred in a royal cell, shaped somewhat like an acorn, and generally built on the edge of a comb. From the time the egg is laid to the maturity of the queen, as an insect, from sixteen to twenty-two days may elapse. A larvæ issues from the egg in three days after it is laid, at the ordinary temperature of the hive in spring or summer. It continues in the larvæ state in the cell, uncapped, from five to eight days; and then, as a nymph or pupa, sealed over, remains dormant as it were from eight to ten days before it undergoes its final transformation. As a perfect insect the young queen is able to perforate the cap of her cell, and thus liberates herself from durance. Queens can be reared not only from eggs laid in a royal cell, but also from any egg laid by a normal

<sup>a</sup>By a fertile queen is here meant one that has been fecundated by a drone, and is qualified to lay both worker and drone eggs.

queen in a worker cell, or from worker larvæ which have not, as such, advanced beyond a certain stage of development, provided they are fed, as Huber taught, with a specially prepared pabulum or jelly; or if, according to Gundelâch, they are furnished with a more abundant supply of nourishment. But Dzierzon's and Berlepsch's observations show that larvæ so far advanced as nearly to fill the cell, and on the eve of being sealed over, are still fitted for and susceptible of undergoing such metamorphosis. But the workers resort to such older larvæ only when suitable young larvæ are no longer present in the cells or cannot be made available. Formerly it was generally supposed that queens could only be bred from worker larvæ not older than three days and a half. This is now known to be an error—as older larvæ have been used with entire success. Yet it is always prudent, when we desire to rear queens, to select and insert in the hive a piece of worker comb containing eggs and larvæ in the various stages of development.

Every queen requires to be fecundated by a drone before she can lay eggs from which young queens can be reared. To this end she must leave her hive, as the act of fecundation can only be consummated while she is on the wing; never while she is in the hive, or while sitting. She will not leave the hive with this intent, until she has secured the undisputed and acknowledged sovereignty of the colony, by the expulsion or destruction of all the young queens which might become her rivals. At times queens make repeated excursions before they become fecundated; and the susceptibility of fecundation continues only during a limited though somewhat variable period—never, however, exceeding six or eight weeks. When leaving the hive for the first time, she notes its position and form, by hovering about its entrance apparently to reconnoitre its location; and she should not, on such occasions be disturbed or interfered with. It is well, too, if the hive from which a young queen is expected to make an hymenial excursion, does not occupy a very isolated position, that it should differ, or be made to differ, considerably in form and color from those immediately adjoining it. The time chosen for such excursions is generally about one o'clock in the afternoon of a clear, mild day. When successful, she commonly returns with evident marks of concourse with the drone. In about forty-eight hours after fecundation, the queen begins to lay eggs; and common queens do not usually lay drone eggs before the spring of the year after they were themselves bred; though they will lay such eggs abundantly then. Still it is erroneous to say, as Huber does, that she will, in the ensuing spring, lay drone eggs exclusively during a period of twenty-eight days. This is manifest from the fact that at the very time when the most drones are being produced in a normal colony, they still constitute a small proportion in comparison with the eggs laid from which worker bees are hatched. The drone brood, as well as the worker, is deposited compactly in distinct combs or parts of combs, though not unfrequently intermingled. Such

at least is the ordinary condition of a normal colony.

The ovary of the queen is not impregnated by the act of copulation, as was formerly believed; but the individual eggs are subsequently impregnated—and, singularly enough, the impregnation is confined to the eggs intended to produce worker brood. Drone eggs, or rather eggs which are to produce drones, are laid without being impregnated. The abdomen of the queen contains a small sac, called the spermatheca, attached to the oviduct, and into it the male semen emitted by the drone is received during the act of copulation, and becomes more or less filled therewith. The spermatozoa contained in the fluid thus stored in the receptacle, constitutes the fertilizing element. The size of the spermatheca, according to Prof. Leuckart's estimate, is sufficient to contain twenty-five millions of spermatozoa. The spermatheca is connected with and discharges its contents into the oviduct, through which the eggs descend in oviposition, and every egg which is impregnated with one or more of the spermatozoa, on its passage through the oviduct, will contain the germ of a female or worker bee, as these spermatozoa speedily penetrate into the exterior of the egg through the micropyle.

It is hence manifest that the eggs in their natural state do not differ from each other; and as the eggs which produce workers are not externally different from those which produce drones, it is inexplicable how, in the normal condition of a colony, the queen lays only impregnated eggs in the worker cells, and only unimpregnated eggs in the drone cells. But the fact is nevertheless so. Nor is it any longer doubtful that the queen requires to be fecundated only once to become and remain during life, while in health; and to be able to lay tens of thousands of eggs year after year, till she becomes superannuated.

When fecundation is effected she makes no further excursions, nor does she again leave her hive, except when accompanying a first swarm. How many eggs a queen lays daily, or in the course of a year, will probably never be correctly ascertained, as the fertility of each individual depends on her age, health, vigor, and the circumstances by which she is surrounded and influenced. Dzierzon and Berlepsch have known instances where the queen, in the most favorable season, laid between 2,800 and 3,000 eggs. The maximum of 500 assigned by Klopfeisch and Kirschner, is certainly much too small. The fertility continues undiminished for several years, though it usually decreases when she attains her third year. She then produces smaller supplies of brood, and the worker and drone eggs are no longer so rigidly separated as at first—being not unfrequently intermingled in the combs. According to Berlepsch, queens have generally a presentiment of their approaching decease, probably from conscious increasing inability to lay worker eggs. The workers also become aware of this circumstance, from the increased production of drone brood, occurring especially at unwonted seasons. This induces the workers to build royal cells and

rear young queens, while they yet have suitable broods within reach. It is certain that the workers change them at other periods than the swarming season; and that when the change is effected at a time when no drones exist, or the weather prevents the young queen from making her hymenial excursion, the result will be barrenness, or the production of drone eggs only.

Occasionally also, queens which have been laying impregnated eggs, become drone egg layers exclusively; that is, they lay eggs from which only drones proceed. The cause of this has not yet been clearly ascertained. Professor Leuckart, resting his opinion on an experiment, conceives that paralysis of the muscles controlling regular oviposition, may result in this disease, though it is not improbable that the spermatozoa have simply become benumbed or killed by cold.

In the swarming season, each colony that sends out a swarm changes its queen, because the old queen almost invariably accompanies the first swarm. There is indeed only one exception to this on record—Dzierzon having once known an old queen to remain in the hive, while the young queen accompanied the swarm. If the old queen die before the first swarm issues, a young queen will accompany it; and such is usually called a *singing swarm*, because the young queen will be heard teeting (*singing*) before the swarm leaves.

The departure of a swarm results in the formation of a new colony. The *mother-stock*—that which furnished the swarm—not unfrequently, in favorable seasons, sends out one or more after-swarms. These are invariably accompanied by young and unfecundated queens. Occasionally two, three, or more queens are found with such swarms. I have known an instance where eight queens accompanied an after-swarm.

After-swarms usually announce their coming by the teeting and quawking of the young queens. This may be distinctly heard several hours before the swarm issues; and very commonly on the previous evening, by applying an ear to the side of the hive. The *teeting* proceeds from a queen which has emerged from her cell and is at large in the hive. The *quawking*—which is simply a response—is produced by one or more native queens, whom dread of danger keeps secluded in their cells. These latter will not emerge so long as their quawking elicits a response, except during the bustle and confusion incident to the act of swarming, when several may suddenly emerge and accompany the swarm.

The swarming period lasts about two weeks from the day the first swarm leaves. After that all the remaining or supernumerary queens are killed by the workers, or expelled from the hive; one only being retained, to receive the sovereignty of the colony. Sometimes, though rarely, several of these young queens meet and engage in mortal combat, the survivor only being recognized as the ruling queen. It occasionally happens that all the young queens are killed or expelled, and the colony thus becomes and remains queenless.

The drones are produced from the unimpregnated eggs laid by the queen, in a normal state of the colony, and from those laid by a fertile worker in a queenless colony. They require from twenty-four to twenty-eight days for their perfect development. They are males, and their sole use is the impregnation of the young queens. The spring is the usual time of their appearance; and they are expelled or destroyed by the workers as soon as the swarming season is over, or the honey harvest ends—though individuals are sometimes retained till a later period, and even through the winter. They never gather honey, and are never seen visiting flowers or blossoms. They fly out only during the warmer part of the day. Their food is in part the jelly on which the larvæ are fed, given to them by the workers; but the greater part is pure honey, of which they partake freely in the hive. The stomach of a drone will be found full of honey when he leaves the hive, and entirely empty when he returns. A colony which does not expel its drones at the usual period, will in almost every instance prove to be queenless.

The workers are those which exclusively perform the labors of the hive. The queens render no other service than that of laying eggs, by which the population of the hive is replenished and maintained. All the workers are imperfectly developed females and require from twenty to twenty-one days for their development from the egg to maturity. The *male* workers mentioned by some writers are fabulous beings—mere creatures of a fertile imagination.

Of the five senses of the worker bees, that of smell is much the keenest; though they are able to see very well, and have an excellent local memory. Their chief business is to prepare the jelly for the larvæ, to nurse the brood, to gather pollen, honey and propolis, to carry in supplies of water, to secrete wax, and to build combs. They also repair broken combs, close up with propolis any crevices in the hive, defend stores, and in short perform all the labors essential to the prosperity of the colony. Their range of flight extends over a radius of about two miles; but to be very successful in gathering and laying up stores, their pasturage should be within half that range. A worker rarely survives a year. The greater number perish within three months, from accidental causes, and the exhaustion resulting from incessant labor.

The following general remarks may be appropriate here:

1. In a commercial point of view the production of wax deserves especial consideration, as it involves a large expenditure of honey. It is a secretion of the bee, which exudes in the form of thin white flakes, through certain apertures or folds in her abdomen. These are taken up by her hinder feet and carried to the mouth, and after being masticated by the mandibles, is applied in the construction of cells and combs. Huber, Jähne, and others were of opinion that wax is elaborated from honey exclusively; while Berlepsch, Dzierzon, and others, contend that the secretion of wax is greatly aided by the admixture of pollen and water. The percentage



of honey saved by the use of pollen and water cannot always be accurately determined, as Berlepsch has conclusively shown, though it is certainly very considerable. By Gundelach's and Berlepsch's experiments it was ascertained that when bees are secreting wax from pure honey, they consume and digest half an ounce of honey for each ounce of pure comb built, and that consequently twenty pounds of honey are required for the production of one pound of wax. The consumption of honey is diminished when the bees have an ample supply of pollen; but even in such case, from twelve to fifteen pounds of honey will be required for the same purpose. These are ascertained facts, and they should prompt every apiarian to preserve, for the use of his bees, every piece of good clean worker comb he can command.

The bees likewise collect propolis, which is a strictly natural product, and consists of the resinous matter gathered from the Italian poplar, the buds of the horsechestnut, pine trees, &c.

2. The young workers, which feed and nurse the brood, deserve some special notice. They leave the brood combs only occasionally, in the afternoon of a warm day, from one to three o'clock, to discharge their feces, much of which accumulates in their intestines from the pollen consumed in the preparation of jelly for the larvæ. The abdomen is at such times greatly distended. When coming out of the hive they usually ascend its front before taking wing, and generally hover around awhile, with their heads turned toward the entrance, before they leave. At such times, beginners are apt to mistake them for robbers; but they can easily satisfy themselves of their error by killing one of the bees and examining its intestines; which will be found filled with fecal matter.

Simultaneously with these, a number of hirsute, greyish colored bees will be seen issuing from the hive and hovering before it with their heads to its front, in joyous and voluminous gyrations. These are young bees, making their first appearance in this outer worky-day world. Such prelusions, as the Germans call them, occur frequently, not only in the spring, but later in the summer, in all good colonies in which the population is rapidly increasing. It will be observed more especially, if somewhat protracted cool or wet weather has kept the bees housed up a few days—when the bees will come forth in crowds to enjoy themselves in the bright sunshine. It usually takes place from one to three o'clock in the afternoon, and is an evidence of the healthy and prosperous condition of the colony.

3. When a colony becomes queenless, the regular labors of the workers are for the most part intermitted. The secretion of wax and the building of combs almost immediately cease, unless the colony is very populous. In such case they may continue to work for a brief period longer, though manifestly with diminished zeal and assiduity.

It has already been remarked that occasionally some workers lay eggs which produce drones only. The drones so originating are in all respects, though smaller, as perfect insects as

those proceeding from eggs laid by a queen. Yet these fertile workers are abnormal creatures. They are commonly found in queenless colonies only. Hence drone brood is occasionally seen in such stocks, long after all the eggs and brood derived from the lost queen have been hatched. The eggs of fertile workers are placed very irregularly, in drone cells, sometimes in clusters together; and are a sure proof of the queenless condition of the colony in which they are observed. These fertile workers perform no labor, and do not leave the hive as common workers do, deporting themselves rather as queens from the time they thus usurp the queenly function, and receiving from the workers to some extent the homage instinctively conceded to the rank of their sovereign. Their ovaries are imperfectly developed; they are incapable of being fecundated, and can consequently lay drone eggs only, or such as have not been impregnated with male sperm.

5. At the close of the swarming season a kind of black, glossy-looking bees are seen about some hives, whose motions when flying much resemble those of the drones. They hover around with timid and fugacious action, and now and then light on the hive. Matuschka regarded them as *drone mothers*, and for a time this notion was accepted and entertained by many bee-keepers, but had to be abandoned when it was clearly ascertained that the queens can and do lay the eggs from which the drones are hatched. Their vacillating flight and unsteady deportment, and the slender, wasp-like shape of the abdomen, are more distinguishing characteristics, than their blackness and glossyness, which may arise from various causes. They are not common, as they do not make their appearance every summer, nor at every hive; and hence, some old and experienced bee-keepers, having never had an opportunity to see them, deny their existence altogether. Their origin or nature is not certainly known. All that has been written about them, beyond mere description, consists of conjectures serving as the substructure of hypothesis. This is certain, however, that they are of no importance, whatever, for good or evil, in practical bee-culture.

Considerable diversity of size, form and color, is found here and there among queens, workers and drones. Lilliputian, or diminutive workers, occurring in large numbers in a hive, have been described by German apiarians; and white-headed drones are frequently seen. The most remarkable variety which I have myself observed were *albinos*, or white drones with red eyes. Mongrel bees, too, have been noticed by observers of late. Of those seen, some had the head and thorax of a drone united with the abdomen of a worker, or the converse; or the upper half of the body was seemingly that of a drone, while the under half and the legs were those of a worker. These are monsters, of rare occurrence, and of no importance, save as natural curiosities.

The combs in a hive are arranged in parallel sheets, and there are usually passages about one third of an inch in width between the combs.

### Honey Among the Romans.

The consumption of honey and wax, and consequently the demand for them, was so great among the Romans, that the production thereof was an object of the highest importance in rural economy; and no one was deemed qualified to manage a farm who did not thoroughly understand bee-culture as then practised. This was to be made an essential source of revenue to the proprietor, for the Romans were a practical people, who, according to Columella, looked to an increase of annual income in their pursuits more than to a mere gratification of taste. But the natural supply of honey in Italy was insufficient for the home demand, and large quantities were imported from Africa, Crete and Sicily, the superior quality of which induced the Italian bee-keepers to send the finest and most aromatic of their own to market under the name of Sicilian and Cretan honey, as we are informed by Varro. That of inferior quality, as we learn from Pliny, they were in the habit of coloring and sweetening by an admixture of other substances, and strengthening by the addition of various kinds of wine. An annual tribute of honey and wax was imposed on conquered provinces and territory, as on Pontus and Corsica, and the hope of obtaining additional supplies, it is supposed, was among the inducements for their invasions of Germany.

A large amount of honey was required by the religious ceremonies and worship of the people. "Nothing is sweeter than honey," says Varro, "grateful to Gods and men. It is used on the altars." It was particularly prominent among the sacrifices of the peasantry. The numerous rural deities, whose favor and protection they invoked, and to whose service they were attached, claimed a portion not only of the products of their gardens, orchards and fields, but of their flocks and herds and of their apiaries. Also at the feasts of the Gods, described by Ovid, which required costly aliments and precious wines, the delicious honeycake was never wanting. These were composed of meal, honey and oil, and had to be equal in number to the years attained by the offerer. For the domestic worship also of their household deities—the *Penates*—honey "the gift of the Gods," was indispensable; and it constituted a large item at the vernal consecration—*ambarvalia*—of their fields in April, as well as at the annual thanksgiving in October, and likewise at the special worship of Ceres in November, who was regarded as the "flock increaser" and the "honey dispenser," and who, by her union with the rain-god Zeus, caused fruitful seasons. Her priestesses were called "bees," because honey was the first food of the infant Dionysus, the son of Bacchus, whom Ceres bore in her arms, as Isis carried Horus; and she was the instructor of Aristæus in bee-culture. Bacchus, too, demanded a share, as the "discoverer of honey," the "admirer of all sweetness," and the "decorator of the blooming meadows."

Every sacrificial victim offered to the higher gods was sprinkled with milk, wine and honey, and large quantities of the latter were required

in the solemn celebration of their mysteries, and in the obsequies of the dead. The later Romans poured honey in the grave of the deceased. It was with them a symbol of death.

It will hence readily be inferred that their religious cultus involved a large consumption of honey, and that this must have induced increased attention to bee-culture. But the quantity used in domestic economy was still greater, as they were unacquainted with the sugar now in common use. What they called *saccharum* was a very different article, obtained from Arabia and India. It was, as we learn from Pliny, used only medicinally. Honey was thus the only sweetening employed by them for meat and drink, and was as indispensable in their households as sugar is now in our families.

A variety of beverages were prepared for family use by means of honey—some of which we may briefly mention here.

1. Water-honey (*hydromeli*) was a vinous drink, made in the beginning of the dog-days, annually, from pure water freshly drawn from the fountain, or new fallen rain water, and undiluted honey. The mixture was stirred five hours by boys, and exposed to the open air for forty days and nights. It was then run into tight casks and sealed up till it acquired a vinous taste.

2. Salt water-honey (*thalassomeli*) was a mixture of sea water and honey. It was a favorite, well-tasted, and slightly purgative drink, kept in well secured earthen vessels. It was always prepared in the month of September.

3. Honey-wine (*melitites*). This was made by adding to five congies of grape juice one congie of honey and one of salt, and boiling them. It was a rough and harsh drink, occasionally used medicinally.

4. Water-mead (*aqua mulsa*) was prepared in various ways. Generally, a pound of honey was added to a sextor of rain water which had been exposed to sun and air for a year, and repeatedly filtered. It was not thought to be a healthy drink. A cheaper, more pleasant, and more expeditiously prepared kind of mead, was simply a mixture of honey and water, slightly fermented. It was a pleasant, cooling and invigorating drink.

5. Wine-mead or honey-wine (*mulsum*), was made of the best and oldest Falernian wine and the choicest boiled honey. This was the favorite beverage of the Romans, believed to be promotive of robust health and prolonged life. When Augustus, dining with Pollio Rumilius on his hundredth birthday, inquired of him how he had preserved both vigor of body and mind, Pollio replied—"Internally by mead, externally by oil." This was the kind of mead referred to.

6. Rose-honey (*rhodomeli*), made of the expressed juice of roses and honey, was prepared for the sick, and always held in high favor.

7. Honey-vinegar (*oxymeli*), was medicinal. To make it 10 minæ of honey, 5 heminae of old vinegar, 1½ lbs. of marine salt, and 5 sextor of salt water, were mixed, boiled, skimmed, suffered to cool, and then kept in a tight cask. It was used in diseases of the ear, mouth and throat.

8. Wine-honey (*anomeli*), was made of the juice of the best grapes, well ripened, and kept twenty days before pressing, to which five parts of the finest honey were added, and continual stirring in a wooden vessel; it was then covered with a linen cloth, and allowed to ferment for forty days, the scum being occasionally removed. It was then put in a tight cask and so kept till the ensuing spring, when it was bottled.

9. Honey-foam (*sputum*), prepared by beating with the addition of a small quantity of white of egg. It was used to brush over cakes and confectionery before baking.

The largest use of honey, however, was made by medical men, and it would take a large treatise to mention and describe the various preparations and medicaments of which the Roman pharmacopœa could boast. But we are not writing for the sick, nor for the physicians. Our purpose was merely to show that honey was very much in use among the Romans; and we may fairly infer that the demand acted as a powerful stimulant to bee-culture.

**A PETRIFIED BEE TREE.**—The Grass Valley *National*, of California, says: "There was found a few days since in the diggings of John Chew & Co., on Buckeye Hill, in the country between Greenhorn Creek and Chalk Bluff Mountain, a bee tree, with a large bee-hive, honey and bees, all petrified. The remaining portion of the tree in which the bee-hive was found, is two and a half feet in diameter, and forty feet long. Chew & Co. found the petrified bee tree seventy-five feet beneath the surface, while piping their claims. The bee-hive is no matter of fancy, but of pure demonstration. Before us is a sample of a comb full of honey all petrified. The normal thickness of the comb, the duplicate of cells, with their invariable hexagonal shape, are all before us as distinctly as if a fresh piece of honey-comb, all dripping and just cut from the box, had been brought and placed before our eyes on a sheet of paper."

The late Dr. Barton, of Philadelphia, some years ago published an account of poisonous honey, supposed to be produced by poisonous plants, as *kalmia angustifolia*, or dwarf laurel; *kalmia latifolia*, or great laurel; and *kalmia hirsuta*, a pretty little shrub of the Southern States. Other plants, in the opinion of Dr. Barton, produce unwholesome honey. Such are the Pennsylvania mountain laurel, and the *Datura Stramonium*, or Jamestown weed. These plants ought to be extirpated from the vicinity of bee establishments.

It may appear singular how bees can fill horizontal cells quite full of honey, and yet prevent it from flowing out. It is retained partly by its own viscosity and from adhesion to the sides of a tube of so small a diameter. Each cell is sealed with a flat covering most ingeniously devised. A circle is formed around the mouth of the cell which is gradually diminished by other concentric circles, until the aperture remains a point capable of being closed by a single grain of wax.

In large commercial towns, there are men of overgrown fortunes, who, on retiring from the active business of life, with the expectation of enjoying the remnant of their days, find themselves unexpectedly disappointed in every attempt to be happy. The secret of their misery is this—an idle man is always miserable. To such gentlemen I would strongly urge the culture of the bee. If not themselves fond of the product, give it to the poor; and if not philosophers, they would insensibly as apiarians find themselves studying the great volume of nature, whose fair page never before arrested their attention. And if any one should have the misfortune to be a skeptic, or even tinctured with infidelity, his contemplations on the habits and economy of the little honey bee, would at once settle all his doubts.—*Smith*.

Let it be remembered, that wherever the bee may be placed, provided its liberty is untrammelled, whether in the dense wild forest, the cultivated field, or the thickly inhabited town, regardless of surrounding circumstances, it pursues, with unwearied toil, its characteristic routine of service for the common good, and fills its garner in the calm of summer, against the vicissitudes incident to the change of seasons.

The untiring industry of the bee should constantly admonish the indolent that "by industry we thrive," and perhaps prompt some to make exertion, if in nothing else, in raising bees—as there is always a prospect of gain, independent of our own personal labors, from the surplus stores they accumulate.

The effects of the sting of a bee are very different on different persons. Whilst a single sting will produce alarming symptoms in one individual, another may receive numerous punctures without sustaining pain or inflammation in any considerable degree; sometimes without suffering either.

The activity of the venom varies according to the season of the year. A sting received in the winter produces much less inconvenience than one inflicted in the summer; the pain and inflammation are neither so intense nor of so long continuance.

The perspiration of the human body is particularly offensive to the minute organs of the bee. As the perspirable matter is different in different persons, this at once explains the reason why bees have such strongly marked antipathies to certain individuals. Indeed, this manifestation of dislike towards some persons is so remarkable as to give the unconscious offenders the strongest prejudices against the interesting insect.

A strong inducement for engaging in the cultivation of the honey bee, in cities, arises from the consideration of the fact, that an ample return is speedily made for any moderate expenditure of money, in a most excellent, wholesome kind of food, at a cost so much below the ordinary market price, as to make it an object, even with the rich.



## THE AMERICAN BEE JOURNAL.

WASHINGTON, JULY, 1866.

THE AMERICAN BEE JOURNAL is now published, monthly, in the City of Washington, (D. C.,) and all communications should be addressed to the Editor, at that place.

We now resume the publication of the "AMERICAN BEE JOURNAL," in accordance with the intention expressed at the close of the first volume, and the very general wish of its former readers.

The want of such a periodical is more widely felt now than it was a few years ago, when bee culture, on a system regulated by scientific principles, had scarcely been thought of. Then, though the number of hives in the country was really great and increasing, collections, such as might claim to be called *apiaries*, were rarely to be found in any section. Few persons, too, even among professed entomologists, had any correct knowledge of the natural history of the bee; and the whole subject was regarded and treated on every hand as a mystery. Even those practical bee-keepers who aimed at improvement, instead of striving to adapt their processes to the ascertained habits and instincts of the insect, acted as though they conceived that these could be constrained to conform, in the main, to their own preconceived and crude notions. Constructors of hives, likewise—very few of whom could be called *inventors*—proceeded on the same or similar ideas; and almost every *ingenious* individual who "kept bees" a few months, or a few seasons, fancied himself "qualified, by experience and observation," to contrive a hive superior in most respects to any previously introduced! Patent after patent was applied for and issued (the Commissioner and Examiner being as little conversant with the subject as the inventor), until the models on deposit outlived in number those of butter-churns and washing-machines. With very few exceptions indeed, the collection on exhibition constitutes the most complete museum—or *limbo*, rather—of the results of genius misapplied, of truths misunderstood, and of nature misinterpreted, that can be found anywhere outside of the pharmacopœia of quackdom. Nevertheless, the originators of these failures and humbugs must not be charged with intentional deception or fraud. By no means. In general they aimed honestly to benefit the public—and themselves, and they did their best! There is, moreover, many an idea faintly adumbrated in the apistical lumber-room of the grand storehouse of contrivances at Washington, which may yet be elaborated into something practically useful. Meantime, amid all this bustle and apparent activity, there was no improvement in intelligent bee culture in this country. The progress made abroad was unknown or not yet rendered available here. The number of bee-keepers was certainly augmenting; isolated instances of enormous "yields," and of astonishing success were occasionally chronicled; and here and there

some *lucky* individual, whom location and season had particularly favored, received credit for special skill in management. There was no real advance, however, and there could be none under the circumstances, as there existed no popular medium through which the needed information could be spread before the people. All this has been changed within the last five years. There are now many intelligent, well instructed persons, who are making bee culture a source of profit. These are conducting the business systematically, apprehending no failure, save such as may result from unfavorable seasons, and knowing how to mitigate at least, even disasters incident to those. Having studied the subject scientifically and mastered the theory, they are fully prepared for practical operations. Others, influenced by their example and success, are qualifying themselves to follow in their footsteps; and a productive business is thus rapidly growing up which will soon constitute an important item in the political economy of the country. To this gratifying result the AMERICAN BEE JOURNAL may justly claim to have largely and efficiently contributed by the early diffusion of correct information among bee-keepers, and by enlisting the active co-operation of many who had previously felt no interest in bees. It first brought the whole subject up fairly before the public for consideration and discussion—presenting and elucidating in its breadth and bearing, the new and rational system of culture. Yet in doing this, it published no mere *flashy* articles, resorted to no sensational *claptraps*; and, while giving proper room and scope to the speculations of others, carefully excluded whatever might mislead or tend to malpractice. It now starts afresh, under, as we conceive, more favorable auspices than before, and we trust it will be equally useful and conducive to still more gratifying results. We shall conduct the paper on the original plan—which was to spread before the readers a full and detailed account of the theory of rational bee-culture, as developed by the most eminent and successful apiarians of Europe, and to follow this with such elucidations of practice as may seem to be required to enable them to make that theory available. This plan has been so fully approved that we have no inducement to deviate from it, but rather to persevere as we began—steadily aiming to make the JOURNAL a trustworthy guide on all topics within its province. We have extensive arrangements for obtaining the necessary supplies of material, alike from foreign and domestic sources; and our new location, with the aid of an enlarged apiary, gives us facilities not enjoyed heretofore, all of which we shall endeavor to render available in the management of this paper.

The greatly increased cost of paper and printing constrains us to advance the price of the AMERICAN BEE JOURNAL to two dollars a year. Nevertheless we feel assured that it will be found "cheap at that," by every practical bee-keeper. The amount of original matter which each successive number will supply—most of which could not be obtained from any other source,

or through any other channel, and all of which is thoroughly scrutinized before insertion, will be a rich equivalent for the enhanced price. A recent letter from an original subscriber says: "I have just had my copy of the *AMERICAN BEE JOURNAL* bound, and would not take ten dollars for it if I could not procure another."

There are in this country thousands of crippled soldiers, disqualified for many of the ordinary pursuits of life, shrewd, intelligent men, anxious to secure an honest livelihood. To many of these—farmers and sons of farmers especially—bee-culture may be confidently recommended, as adapted to their disabled condition. It requires only a small capital to start with, and they will assuredly find it a remunerative employment, if they qualify themselves for it by studying the theory on which management is based.

### Italian Bees.

At the first annual convention of the bee-keepers of the Kingdom of Hanover held at Os-naburg, in September, 1865, Mr. Shulze, of Knesbeck, stated that for some years past he decidedly preferred the Italian bees to the common kind. They gathered much more honey, as they ceased breeding earlier in the season, and less honey was consequently required for the larvae.

Mr. Neuer, of Hanover, reported that bee pasturage, in that vicinity was restricted to small shrubbery, gooseberries, raspberries, &c. The season has been very poor. The Italian bees alone procured supplies, and they had an abundance and a superabundance. Where they obtained it was a mystery to him.

Mr. Masbaum, of Voxtrup, said he had not the good fortune to reside in a district where milk and honey flow. His Italian bees greatly distinguished themselves. All his colonies did well. Most of them had three times as much honey as the common bees, and several of them had from four to five times as much. They would steal it wherever they could find it.

Mr. Ruddendorf read a letter from Mr. Humbert, of Weht, stating that his fifty-seven colonies, in straw hives had produced 7,163 pounds of honey, or an average of 125 lbs. each, though he regarded the season as only moderately good.

Some of the ancients must have had hives with movable tops, for Democritus advises the bee-keepers to sprinkle the inner side of the top-board with water, in the evening. This would attract the drones, rendered thirsty by a surfeit of honey, and being there congregated, they may all be taken and killed next morning.

Another, and doubtless equally successful, mode of getting rid of the drones, was to catch one, tear off his wings, and return him to the hive. He would then pursue every other drone and deprive all of them of their wings, from a desire to reduce them to an equality with himself.

### From W. Hartman's Zoological Letters.

Of the bee-wolf (*Merops Apiaster*), certainly one of the most beautiful European birds, I had altogether four specimens. An old pair was caught by means of bird-lime, early in May, in the neighborhood of Vienna. At first they were fed exclusively with May-bugs. When I received them on the 4th of June, they were still very shy, and they never could be thoroughly tamed. The enormous quantity of food which these birds required daily was astonishing. It consisted entirely of living or recently killed insects. Every attempt to accustom them to the use of other animal food failed. At first bees constituted their chief diet, and of these they consumed daily an Austrian sidel full, (nearly a pint), besides a large quantity of meal worms. When fed solely with the latter, they still showed an appetite for more, after consuming from three to four hundred. Its splendid plumage fits the *Merops* admirably for a cage-bird; but a bee-keeper would be horrified by its insatiable voracity.

Some of the ancients believed bees were long-lived creatures. "The bees live seven years," says Pliny, "though few obtain that age—perishing from disease, from accidents by flood and field, by sudden showers and storms, and from exhausting efforts to carry home excessive loads of honey and pollen, when pasturage and favorable weather prevail." Hygeius advised apiarians to gather dead bees, dry them in the gentle rays of the sun, and warm them a day in ashes of figs, when, as he assures us, they would revive and resume work! We cannot guarantee the success of the experiment.

The bee is an orderly, systematic insect, exclusively devoted to its own personal concerns. It is therefore the more important to give it a station where it will be least liable to interruptions. In the yard the remotest corner would be the most proper spot, at a distance from the pump, if there be one, so that in passing to and fro, the bees would not feel particularly annoyed.

Bees, like all insects, breathe through minute holes in the sides of their bodies. If the air, of which they consume a great quantity in a little time, is wanting in vitality, or is loaded with poisonous vapors, they die in a few minutes. Hence the importance of having them constantly supplied with pure fresh air.

Honey is a vegetable secretion, which appears at different seasons of the year, especially when flowers in general are in bloom. The bees fix it up with their long tongue or proboscis from the flowers, swallow it, and on their return to the hive, discharge it into the cells.

The honey derived from mignonette—"the Frenchman's darling"—is of superior fragrance, and supplied in great abundance. The flowers continue in bloom all summer and autumn, affording both honey and farina the whole season.

### Purity of Italian Bees.

Sometime last summer an American bee-keeper, who had frequently imported Italian bees from Germany, at a heavy expense, and had regularly been chagrined to find, soon after their arrival, that impure stock had been sent to him, addressed a letter to the Rev. George Kleine, of Lieuthorst, in the Kingdom of Hanover, requesting him, as an expert, to furnish such a description of the appearance and markings of pure Italian stock, as would enable him to detect the imposition at once. In reply Mr. Kleine states that complaints of similar imposition or carelessness have been made in Germany, and assuming thence that a minute account of the marks of genuineness of the Italian variety of the honey bee, would be generally acceptable and useful, proceeds to give the description, in the following article:

"The purity of an Italian colony depends on that of the queen, and she only is to be regarded as pure whose progeny, queens as well as workers and drones, prove to be pure and genuine.

Those workers are pure whose first three abdominal rings are bright orange or buff colored—the first being slightly, the second more strongly, and the third broadly bordered with black, while the terminal rings are fringed with a grey or white down. If the third ring is not orange-colored, or if the orange of the ring is not of uniform hue, but tinged with a flush of black, the race is no longer pure—this trait manifesting an admixture of common blood.

The drones must likewise exhibit three orange-colored rings, as marks of their purity, but in addition, the terminal rings must be margined downward with orange. In them, however, the first three abdominal rings are not bordered with black, as in the workers, but are entirely orange, except a black marking on both sides, running more or less towards the centre. The ventral rings are wholly orange-colored. If the drones have not orange-colored rings, but orange-colored spots instead on the sides of the first rings, this is *prima facie* evidence of degeneration—and that of greater or less degree, according as the orange color is less or more exhibited.

The queen is more fully and more brightly colored than either the drones or the workers. Her first abdominal rings have scarcely a perceptible margin of black; and her terminal rings likewise have more of orange color than of black. Those in which the orange color is greatly wanting are degenerate, having a proportion of black blood. Such queens are very common among those reared in Germany; and are not unfrequent also in Northern Italy, where the two races co-exist. The intermixture there is consequently no unusual occurrence, and was observed already by the ancients. Thus Virgil advises care in the selection of young queens, so that the better kind may reign in the hive—one "brightly colored and glowing with gold." Such queens, of mixed blood, when purely im-

pregnated, may still produce purely marked workers; but their drones, approximating more or less to the black race in proportion to the degeneration of the mother, are frequently hard to distinguish from common drones. The case is the same with young queens reared from the eggs of such queens. They inherit the degeneration of the mother, and are often blacker than common bees. The results of this degeneration, which has improperly been termed *bastardizing*, are singular and surprising. While in one hive containing a degenerate queen, purely marked Italian workers will occur side by side with common ones, and such as hold a middle station between the orange colored and the black—for Virgil already describes two kinds of workers, as well as of queens—in another hive, containing a similar queen, the workers will be purely marked Italian, exclusively. The latter phenomenon may readily mislead the bee-keeper to suppose that he is in possession of a pure Italian queen, such as may safely be bred from. But the unsatisfactory results soon manifest themselves, and the third generation usually proves wholly degenerated or black; and all the enjoyment anticipated from cultivating the Italian bee vanishes at once and forever. This happened to the Baron of Berlepsch. He received originally a queen partially degenerated by an admixture of black blood, among whose progeny, however, were some bright orange queens, though others were as black as ravens. As the bright ones were probably not impregnated by pure drones, he obtained a still more deteriorated brood from them; and as the degeneration thus progressed rapidly, he soon lost all patience, and having failed to maintain a pure stock, concluded it was impossible to perpetuate the race in its purity. Dzierzon, managed matters otherwise. The secret of degeneration did not escape his piercing eye, and he early adopted means to prevent it. Selecting as queens to breed from only those which by the purity of the progeny of their daughters, proved their own genuineness, he preserved his stock from taint, and now ever selects for preservation only the finest and brightest of his young queens, and takes pains to have them mated with drones undoubtedly pure.

Obviously, however, he who breeds Italian queens for sale, cannot in all cases assure himself of their purity, by the only certain criterion of the genuineness of the queens he sells. The most he can generally do, is to be certain that they produce pure workers only. Hence it is by no means surprising that thousands of queens have been sent out, and dearly paid for, which, in common phrase are simply *bastardized* and of no value whatever to breed from. At the low prices which are beginning to prevail, it were unreasonable to expect the seller to guarantee the absolute purity of the queens sold. He who would exact such guarantee must be willing to pay a corresponding price—which cannot well be deemed too high for him whose object it is to propagate the pure race exclusively. For him a queen of mixed blood would not only be of no value whatever, but most decidedly injurious."



### Sting of the Bee.

Dread of the bee's sting deters many from engaging in bee culture, whose tastes and studies would otherwise well gratify them to make it a source of enjoyment and profit. Certainly in the case of individuals whose habit of body is such that severe pain and much inflammation follow the infliction of a sting, they may be excused for reluctantly placing themselves within reach of an insect so irascible as the honey bee is commonly regarded or reputed to be. Nevertheless, the danger of being stung is by no means so great as is generally supposed. When not disturbed or annoyed at or near their hives, bees rarely volunteer an attack on a person who approaches their domicile in a confident, though calm and gentle manner, and they speedily become accustomed to the presence and movements of a keeper who visits them frequently. As the horse appears intuitively to know whether his rider is fearless or timid, so bees seem instinctively conscious whether he who intrudes within the area of their assigned homestead, comes as a friend, or is to be suspected of hostile intents and warned off accordingly. Once aware of this, the bee-keeper soon acquires the habit of approaching his hives with an assured step, and of operating among them with the self-possession of one who neither meditates or apprehends harm. Still, from causes known and others yet unknown, bees are sometimes in an excited or peculiarly irritable mood, or operations have necessarily to be performed, which wake up all their innate and latent ill temper; and the bee-keeper must then approach them, either protected against their assaults by beehat and gum gloves, or make up his mind to bear with

"the better fortitude  
of patience and heroic martyrdom"

the storm of stings to which his manipulations expose him. These, however, are rare occasions. Ordinarily a few whiffs of smoke, seasonably and judiciously employed, suffice for the protection of the face, though it may fail to subdue the not "insignificantly fierce" anger of the little assailants. Courage, calmness and confidence will, in the end, obtain the mastery, and enable the bee-keeper to move about among his bees without annoyance or apprehension. But this seems to the impatient novice much too slow a process, and he fancies that the old and experienced operator, who goes to work so calmly and deliberately, must be in possession of some grand charm which assures him of immunity, or renders the poison-freighted sting innocuous. Vain fancy! The first half of the arcana has already been disclosed, and we need only add that man's physical system soon becomes so accustomed to the action of the poison that scarce any pain is felt from the puncture of the sting, little inflammation is produced, and no inconvenience or suffering results. Frequent stinging effects all this, and nothing else can. Every bee-keeper who has been long and regularly employed about his bees, has experienced this, in a greater or less degree; and many have become so "case-hardened" as never to feel the slightest apprehension,

however numerous and menacing the hostile demonstrations of the armed hosts may seem. When sufficiently self-possessed to receive the infliction of a sting without a shock of the nerves, the pain is usually insignificant and there the matter ends.

Nevertheless, most new beginners inquire anxiously, if not for some prophylactic, still for an efficient remedy; and almost everybody in return has some topical application to recommend—some infallible nostrum sure to work instantaneous relief! The ancients fancied there were certain substances which secured the possessor against the danger of being stung. Pliny tells us that he who carries a piece of bloodstone in his pocket is safe from attack; and immunity may likewise be secured by anointing the face and hands with a salve compounded of crushed asparagus leaves and olive oil. A modern writer assures us that a wallflower held in the mouth will keep the bees in check; and another declares that three leaves of ripple grass kept under the tongue while working among bees, will have a like good effect. Thus was it at all times. Some safe-guard was sought, some *cure-all* was desired—recipes and prescriptions were devised and multiplied, until now there are about as many specifics for bee stings as there are for the toothache, and they are probably equally efficient. We shall enumerate some of these for the benefit of the inexperienced and of those who have faith in simples. Apply spirits of ammonia, solution of salt, essence of lavender, oil of rosemary, quince juice, warm vinegar, oil of balsam apple, olive oil, cream, essence of thyme, parsley or peppermint, onion juice, juice of savory, marsh-mallow or parsnips, honey, tobacco juice, spittle, moist clay, rasped potatoes, white of egg, collodium, cold iron, ice, a salve compounded of bolus, camphor and rosewater, ear wax, or the crushed body of a bee. This list, we judge, should satisfy the curious in such things. The novice in bee-keeping may test them all in succession and decide which is most efficient—though, probably, by the time he gets through, he will have made the interesting discovery that *he can dispense with them all!*

A new beginner, however, may well be excused, if he prepare for practical operations among bees, by arraying himself in a bee-dress made after the most approved French fashion, which of course would pass muster in the *beau monde*, as being strictly *a la mode*. Dr. Debeauvoys'—excellent authority in the art of complicating matters—describes such a costume as consisting of an ordinary blouse, such as is worn by the French peasants, having attached to its collar a head-piece of crape, made sack-like, three feet long and two feet in diameter, with a drawing-string at top, by means of which it is secured to the hat just above the brim. This is kept properly distended before the face by wearing a stiff pasteboard ring or collar four inches broad around the neck. The blouse is stuffed in wide trousers, the legs of which are secured in coarse and loose hose, over which again are worn a pair of stout corduan half boots. The hands are to be protected by a sort of sack-mittens made of two folds

of muslin with a thick layer of wax taffety interposed. The sacs are closed square before the hand without fingers or thumbs and are fastened to the arms above the wrists by india-rubber bands. Thus attired, the operator may indeed regard himself as sting proof, albeit not "iron clad;" though he will unquestionably find himself "incommodiously prest in and ill at ease" all around, while manipulating among his astonished bees in hot weather. The dress could have been devised only by one who had no conception of the manner in which bees can be handled by an expert, and whose notion was that perfect immunity from danger was the one thing needful.

A simple bee-hat, such as is commonly employed for the purpose in the country, is all that is required by the most timid on any occasion, and even this should be worn only in emergencies. As for the hands, he who would become a true bee-keeper and fearless operator should eschew all protection for them. "He who plays at bowls must expect rubbers;" and he who keeps bees must count on being stung. Let him make up his mind from the first will he find that a "fixed fact," take the thing coolly and work on. In due time he will come to regard stings as of small consequence. He will find the pain to be in reality infinitely less than that caused by tooth drawing, and will soon begin to wonder whether the poison has not lost its venom, since it no longer produces swelling. When he reaches this point, as he surely will in two or three seasons, if he perseveres doggedly in manipulating with exposed hands and fingers, he may lay aside his bee-cap also, dismiss his dread, and trust himself unconcerned amid the pugnacious hosts, now to be regarded as his friends and especial favorites.

Still, after all that has been said, it must be confessed that although a single sting is an insignificant matter, yet when they come by the score, as they will on some occasions, the sensation is by no means agreeable. Habit cannot well reconcile all constitutions to that any more than a cold bath, pleasant enough in itself, can be indulged in by some men without giving them a severe nervous shock.

### Weight of Bees.

Reaumer ascertained that three hundred and thirty-six bees weighed one ounce; consequently it takes five thousand three hundred and seventy-six to weigh a pound.

According to the celebrated John Hunter, two thousand one hundred and sixty workers may be contained in an ale-house pint.

Bees collect some portion of their stores, at certain times, from what is called honey dew. This is an exudation or deposit found on the leaves of trees in sultry weather.

Cros, the honey thief of Theocritus, used no gloves when robbing the hives of honey; and the bee cap seems to have been altogether unknown in those days.

Bonner says—"If I intended to kill a hive of bees in autumn, I would prefer taking away their queen from them about the end of July, and leaving a great number of common bees in the hive, which, as they would have few bees to nurse, would collect a greater quantity of honey in that period, than if they had a queen in the hive daily laying eggs for them, which would employ a good number of the bees to hatch and nurse the young, and thereby the fewer would be employed in collecting honey."

It is usually in the months of July and August that the massacre of the drones is effected. It is not to be supposed that the workers know that they would perish with hunger were the drones preserved; but there is probably a certain time when the drones make such an impression on the senses of the workers as tends to irritate them and prompts to their destruction.—*Thatcher.*

"It is commonly believed that an apiary is not well situated unless it stands in the sun. This is an error. Bees like the shade when working, and like the sun only when in the fields, which thus animates and sustains them. They thrive well in thick forests, and delight in them, because there they find a uniform temperature and propitious shade."—*De Gelieu.*

It is utterly useless to recommend to the public any system of bee culture involving the use of complicated machinery or of fanciful contrivance. It is better to impart simple instruction in a gradual manner, and to excite interest by rousing and gratifying curiosity.

A swarm from a *very old* stock, although it may have a young queen, is *carefully to be rejected*; for the bees having been bred for the most part in contracted, and perhaps vermin-eaten cells, will be generally found of small size and insignificant in numbers.

As a general rule not more than from 25 to 30 lbs. of *honey* should be allowed for the winter provision of a stock of bees. More than this they are never likely to require if their hive be well made and so situated as not to be exposed to the extreme of cold in winter.

In some parts of England bee-keepers are in the habit of giving their straw hives, as soon as made, two coats of *thick* paint, and then laying them aside till wanted; and every winter they give a fresh coat of paint to each hive in the apiary.

Being a vegetable production, the properties of honey, and its aroma, depend entirely on the nature of the plants which form the pasturage of the bees.

Among bee pests may be enumerated pigs, (with their sties, and all dung heaps,) fowls, mice, snails, ants, toads, hornets and wasps.

### Glycerine as Bee Food.

Dr. Aszmusz, of Leipzig, in a communication to the *Bienenzeitung*, dated April 14th, 1866, strongly recommends glycerine as a bee food, when for any reason feeding becomes desirable. Glycerine is a secondary product, obtained in large quantities in the manufacture of stearine and soap. It has become an article of great commercial importance, as its application for new purposes in the arts, is continually becoming more extended. Though the demand for it is very large and increasing, and sources of supply are probably sufficiently numerous to keep down the price; and where it can conveniently be procured directly from the manufacturer, thus avoiding heavy charges for freight, it would be a cheap substitute for honey, sugar, or sugar candy, in bee-culture, if further trial corroborates Dr. Aszmusz's statement.

It has a sweet though somewhat tart taste, with more sweetness than grape sugar, and less tartness than potato syrup. It does not crystallize in the cells, as solutions of cane sugar do; nor is it liable to become gummy, which so decidedly unfits starch syrup for fall or winter feeding. It is further remarkable for a quality which adapts it peculiarly to the wants of the apiarian. It is unsusceptible of fermentation, and consequently does not become acid when stored in the cells, unless perchance it undergoes some chemical change in the stomach of the bee.

It has been used in England for a long time as a substitute for sugar in the preparation of liquors, and as a *sweetening* where the manufacture of lemonade is carried on extensively.

The best glycerine is the pure white, though the yellow also is suitable for bees. The kind used for filling gas metres is too much diluted to be of any value as a bee food, and is impure besides.

Dr. Aszmusz says that his bees readily consume the glycerine. At first he mixed a portion of honey with it, but in a short time they ate it greedily without such addition.

We hope that American bee-keepers will fully test this article, and communicate the result to us. Apart from the occasional necessity of winter feeding, there is in many localities a period, in the spring, when stocks suffer from the want of natural supplies. Liberal feeding, even at a heavy cost, is then true economy, and is sure to *pay* in the end. If glycerine possesses the good qualities attributed to it, and can be procured at reasonable price where wanted, the articles now commonly used for feeding would doubtless soon be superseded by it.

Repeated observations show that the secretion of honey is powerfully influenced by the electricity of the atmosphere; and bees never labor more actively than during humid, sultry weather, and when a storm is approaching.

When a hive of bees is kept in a state of alarm, by the tormenting ingenuity of mischievous boys, the time in which they would be ranging over the fields in search of honey and pollen, will be lost in defending their premises.

The hives hawked about by itinerant pedlars, homeless and nameless, as patents of incalculable and *inconceivable* merit, have really no claim to respectful notice. To buy them is actually foolishly wasting money.

The best swarms undoubtedly, other things equal, are those which proceed from *two year old stocks* of large size, that sent out a swarm the previous year, because it is certain that they have young and vigorous queens.

Prime swarms should, if possible, be twice as large as they usually are; and two small prime swarms, if issuing at the same time, should be united, thus making them an active and productive colony.

Simplicity of detail and perseverance in instruction, as well as personal example, must go hand in hand together in any attempts to increase the number of zealous bee-keepers in a rural population.

If bees are not allowed to possess anything analogous to reason, the regard for their queen, and the watchful care of their young, must result from some pleasurable sensations derived from them.

No dripping of trees, nor water drops from the eaves of houses, should be suffered to fall upon or near the apiary; for dampness is of all things perhaps the most hurtful to bees.

Reanmer has calculated that within one hour, three thousand bees have returned from their collecting tour, to a hive whose population did not exceed eighteen thousand.

The harvest of honey, like that of grain, is early or later, more abundant or scarce, in different years, according to season and variety of climate and cultivation.

"It is a mistake to suppose that hives exposed to the sun produce the earliest and strongest swarms. I have more than once experienced the reverse."—*De Gelieu*.

Bees have a sort of language among themselves, whereby they know each others' wants, as in building their combs, unloading the laborers, feeding each other, &c.

The royal or queen cells, are of a pyramidal form, with a wide base and a long conical top. They hang perpendicularly in the hive, and point downward.

Swammerdam found nearly four thousand cells built, in six days, by a new swarm consisting of less than six thousand bees.

"Whoever is fond of his bees is fond of his home"—is an axiom of irrefragable truth.

Keep away from your bees' neighborhood all vermin and foul smells of every kind.